"Where the stipulations of the bill of lading require the consignee to be present and receive the goods as soon as the vessel is ready to unload, and that they shall be at the consignee's risk as soon as landed on the dock, and the consignee is duly notified, and attends in order to accept the goods as landed, and takes more or less charge of them, the stipulation is held to exempt the ship from subsequent loss or damage." In such cases as the consignee has due notice of discharge and accepts the goods, the duty of protecting the property is cast upon him and the ship is released. The *Surry*, 26 Fed., 791.

In *Willis and others* v. *the steamship City of Austin*, 2 Fed., 412, it was provided in the bill of lading: "It is expressly understood that the articles named in this bill of lading shall be at the risk of the owner, shipper, or consignee thereof, as soon as delivered from the tackles of the steamer at her port of destination," and that if the goods were not taken away the same day by the consignee, they might, at the option of the steamer's agents, be sent to store, etc., at the expense and risk of the owner, shipper, or consignee. A case of merchandise had been delivered on the wharf, and was taken away by the draymen of a party to whom it was directed, though not the one for whom it was intended.

The steamer was held not liable for the loss, Choate, J., constructing the bill of lading, saying: "I think, therefore, the case is governed by the case of the *Santee*, and that the sh p is not responsible, because the goods in question were delivered within the meaning of the bill of lading, and the consignees had full notice to attend, and did in fact attend, upon the discharge of the vessel to receive their goods. Libel dismissed, with costs."

In the case of the *Tybee*, 1 Woods, 358, Fed. Cases No. 14304, 5 Myer's Federal Decisions, 362, the bill of lading contained this agreement: "It is expressly understood that the articles named in this bill of lading shall be at the risk of the owner, shipper, or consignee thereof, as soon as delivered from the tackles of the steamer at her port of destination, and they shall be received by the consignee thereof, package by package, as so delivered."

Justice Bradley, construing this contract, says: "The carrier's liability ceases, of course, when he has delivered the goods according to the bill of lading. The general rule with regard to delivery, as laid down in the books, is that, in the absence of a special contract, the goods are to be regarded as delivered, so far as the carrier's responsibility is concerned, when they are deposited on the proper wharf at their place of destination, at a proper time, and notice has been given to the consignee."

Applying the doctrine established by these authorities to the case before us, the facts fail to sustain the charge of negligence on the part of the master. Negligence rests upon a breach of duty, and the record in this case does not show wherein the master failed in the discharge of his duty under the contract embodied in the bill of lading. No question is raised as to his compliance with this agreement to the time the rice was landed on the wharf. The substantial complaint is that the goods were delivered on the wharf more rapidly than they could be removed by the consignee, and that, by reason of this rapid delivery and a failure to properly separate the goods, the removal of the rice was delayed, in consequence of which it was injured by the rain. The evidence shows that the consignee had ample notice of the time and place at which the steamer would begin to unload. It further shows that he made inadequate preparations for the removal of the goods. At 8 o'clock a. m. he had but two drays at the wharf, and that they had removed 40 bags of rice before the rain; that the consignee had ordered a number of additional drays, but these failed to appear until too late to remove the rice before it was injured. The consignee was told by the agent of the railroad company, at the wharf of which the vessel was unloading, that he could use the granary at the shore end of the wharf to store his rice for protection in the event of rain. Of this shelter he made no effort to take advantage. The evidence does not show that the unloading on the wharf was unusually rapid and such that the master should have known that the consignee could not take proper care of the goods after delivery from the ship's deck. If the consignee, who knew his resources for removing the goods, believed they were being landed so rapidly as to delay him in their removal and in taking proper care of them, it was manifestly his duty to inform the master of that fact, in order that the goods might be discharged in a manner not to embarrass the consignee in their removal.

As to the mutual duties of the consignee and the master, Justice Clifford said in *Salmon Falls Manufacturing Company* v. *The Bark Tangier*, 1 Clifford, 396, 5 Myer's Federal Decisions, 385, Fed. Cases No. 13743: "Consignees and masters of vessels are expected to cooperate in the delivery of consignments; and if they do so, it will seldom happen that any controversy will arise; and, when they do not do so, the delinquent party must abide the consequences." The master can not be presumed to know the facilities of the consignee for removing his goods. That is a matter over which he has no control, nor does the law make it his concern. He could not order one dray more or less, nor in anywise control the removal of the goods from the wharf to the store of the consignee. The *Santee*, 5 Myer's Federal Decisions, page 410. For him to have undertaken to interfere in any way in the transportation of the goods from the wharf would have been to go beyond the obligations of the contract which fixed his responsibility as a carrier, and an unwarranted interference in a matter that was entirely under the control of the consignee, and with which he alone was concerned. The consignee knew his resources for removing his goods. The same observation may be made on the failure of the consignee to object to the goods being landed on an open wharf, or to the time of the landing or the conditions of the weather. Had the master persisted, after objections by the consignee, in landing the goods in such way as to likely result in their damage, the ship might have been held liable therefor. The *Grafton*, 1 Blatchford, 173; Fed. Cases No. 5655, 5 Myer's Federal Decisions, 365.

The consignee being present, acquiescing in the time, the place, and method of discharge, receiving the goods according to the special contract of lading, he thereby accepted them, and the master was relieved of further responsibility for their preservation. They had passed from the custody of the master by actual, not constructive, delivery, to the custody and control of the consignee. They were in his custody when damaged, and the loss can not be thrown on the ship.

As to the finding of the district court that the master was negligent in landing the rice in the face of a threatened storm, we have stated the evidence on which the district court rested this conclusion. It consists of the facts that on each of the preceding days there had been light showers; that of the 21st being less than one-hundredth of an inch, "a mere trace;" the prediction of the Weather Bureau, published in a Charleston newspaper and posted at about fifty places in the city on the morning the ship began to unload. We are not prepared to give these predictions of the Weather Bureau the character of established facts, the failure to observe which shall constitute negligence in any of the business relations of life. The science of forecasting the weather has not reached the degree of exactness which will justify the court in saying that men in their every day avocations, whether sea-faring men or others, are bound to take notice of and be guided by its local forecasts, and that it is negligence not to observe them. The case is different where storms of great violence and extent, such as frequently occur on our Atlantic coast, and where information of their existence, course, and the probable time at which they will reach designated points, is given by telegraphic communication and by storm signals, which, if brought to the notice of the master, or of which it is his duty to take cognizance, these he would be bound to observe.

It may be questioned if there is anything of which the general public is expected to take cognizance that is less reliable than are the daily weather forecasts to which it is accustomed, and which are brought to its attention by newspaper notices and printed circulars. Were we disposed to give the weather forecasts the weight allowed them by the district judge, there is no evidence that they were brought to the notice of the master. Further, if the master was bound to take notice of the weather predictions, he should only be held liable for not providing against the light showers predicted, against which, as the record shows, the tarpaulins would have afforded sufficient protection for the rice, and not be required to provide against such an unexpected and heavy downpour of rain as that which did the damage, and was not predicted by the local weather notices. Again, the consignee had equal opportunity, at the least, with the master to anticipate the storm, the latter being unacquainted with the English language, the record showing that his deposition in this case was taken through an interpreter.

In our view, the district court should have dismissed the libel, and it is ordered that the same be dismissed, with the costs of this and the district court for the appellant.

THE EVOLUTION OF THE THERMOMETER.

Under the above title the Chemical Publishing Company of Easton, Pa., has just published a small volume by Dr. Henry Carrington Bolton of Washington, Pa., summarizing the results of his personal researches into the history of the development of the modern mercurial thermometer. Since the publication of the Editor's Meteorological Apparatus and Methods, in 1887, two well known German authorities, Dr. E. Gerland and Dr. H. Hellmann, have contributed to our knowledge of the early history of the thermometer. The latter, in his reprints of classic scientific literature, and the former in his history of the art of experimentation in physics, Leipsic, 1899. According to both these authors, as well as the present more extended publication by Bolton, the thermometer, as distinct from the thermoscope, was *not* invented either by Drebbel, about 1608, nor by Porta, 1558, nor by Bianconi, 1617, nor by Leurechon, 1624, but really and truly by Galileo Galilei before he accepted the professorship at Padua, in 1592. Galileo's first instrument seems to have been a crude air thermometer, and probably in this form was used by his pupil Sagredo, whose letters of 1613 and 1615 give many details. Galileo himself speaks of the degrees or relative temperatures at different places, and Sagredo says that differences of temperature of 100° can be determined; in fact, in one of his letters he says that in the greatest heat of summer his newest thermometer stood at 360°, whereas with a mixture of snow and salt it fell below the extreme cold of winter by about one-third the difference between the extreme atmospheric temperatures of summer and winter. To the present writer it seems most probable that the scale of 360°, used by Sagredo, in 1615, was formed by bending a long narrow glass tube around a graduated circle, or possibly in a spiral around a graduated cylinder, at the lower end of the tube was the bulb filled with a liquid, water or wine, or oil. The Editor believes that some such simple form of the modern liquid thermometer had been suggested to Sagredo by Galileo, so that the pupil speaks of it as the "instrument for measuring heat which you invented, but which I have made in several convenient styles," or again, "which has been improved by me." Dr. Bolton says, on page 30, that "Jean Rey, a physician of southern France, was the first, in a letter of January 1, 1632, to clearly state that he made use of the expansion of a liquid in the bulb of a thermometer." The simple straight thermometer, partly filled with liquid, and sealed at its upper end, was apparently first made by the famous glass blowers of Florence for the use of Ferdinand II, Grand Duke of Tuscany. Dr. Bolton suggests that in this important modification Ferdinand was probably guided by the experiments made by other Florentine savants to show the effects of atmospheric pressure.

In 1642 Galileo died, and in 1657 his pupils were gathered together by Prince Leopold, the brother of Ferdinand II, in an academy known as the Accademia del Cimento. This continued for ten years, and in 1667 the general results of the researches of its members were published by the Prince in classic style. The thermometers used by this academy are known as the Florentine. They simply consisted of a long tube with a spherical bulb at one end and were hermetically sealed at the other. The tube was filled with spirits of wine, because it was more sensitive than water. The coldest temperature of winter corresponded to 20° on the scale and the highest of summer to 80°. The degrees were marked with bits of enamel colored white, black, and green. The alcohol was colored with a solution of kermes or *sanguis draconis*. The principles on which these thermometers were made were certainly understood in Florence in 1641, shortly after which time the Grand Duke Ferdinand had used them when experimenting on the artificial hatching of eggs. About that same time the Duke established a series of meteorological stations, of which we certainly know—

Florence, Pisa, Bologna, Parma, Milan, Innsbrück, and Warsaw. The instruments that were furnished were: Florentine thermometers, Torricelli's barometer, and Ferdinand's hygrometer. These were observed several times daily and records were kept with great fidelity. One of the Italian daybooks, containing sixteen years of observations, was examined by Libri in 1830. The meteorological observations made in Florence from December 15, 1654, to March 31, 1670, were published entire in the introduction to the Archivio Meteorologico Centrale Italiano, Florence, 1858.

The Florentine thermometers were introduced into France by the way of Poland. The Grand Duke Ferdinand had presented some philosophical apparatus to the envoy of the Queen of Poland, and her secretary sent one of these thermometers to the astronometer Ismael Boulliau, in Paris, with the statement that Ferdinand always carried in his pocket a small one, about 4 inches long. It seems likely that this, the first Florentine thermometer seen in England, was brought to the Royal Society in London on the 30th of May, 1663, by the French traveler Monconys, who was visiting the Honorable Robert Boyle, and was brought by him to the meeting of the Royal Society on that date. As late as 1741 Florentine thermometers continued to be used throughout Europe; thus, at Dantzie, in that year, Hanow reported temperatures on the usual Florentine scale, the zero being in the middle of the tube and indicating the average temperature, or about 45° Fahrenheit. In 1730 Réaumur speaks of Florentine thermometers as in common use.

With regard to the Fahrenheit thermometer, Dr. Bolton says:

Daniel Gabriel Fahrenheit was born at Danzig, Prussia, 24th of May, 1686, the son of a well-to-do merchant. After receiving private instruction at home, he attended the gymnasium, but when fifteen years old he had the misfortune to lose both his parents in one day (14th of August, 1701), and was then sent to Amsterdam to enter a business house. There he completed his apprenticeship of four years, but forsook commerce in order to follow his inclination to study physical science and to travel; he became interested in meteorology and acquired great skill in constructing thermometers. In 1714 he visited glassworks in Berlin and Dresden to supervise the manufacture of the tubes for his instruments, and on this journey he called on Professor von Wolf in Halle, as stated.

Returning to Amsterdam he established himself as a maker of philosophical instruments; at that period three distinguished men of science honored Holland, Dr. Hermann Boerhaave, Professor of Medicine and Chemistry in Leyden; Pieter van Musschenbroek, Professor of Mathematics and Physics in Utrecht, and Willem Jacob van's Gravesande, Astronomer and Mathematician at the Hague, and these refer in their writings to Fahrenheit and his thermometers. When he visited England some time prior to 1724, he was well received and honored by election to membership in the Royal Society. Fahrenheit died, unmarried, in the land of his adoption, 16th of September, 1736, at the age of fifty years; he was buried in the Klosterkirche in the Hague.

Fahrenheit's practical work in thermometry began as early as 1706; at first he used alcohol only, but afterwards became famous for his mercury thermometers. In 1709 he sent his instruments to distant places, Iceland and Lapland, and took them in person to Sweden and Denmark. For eighteen years Fahrenheit kept secret his method of manufacture for commercial reasons, but between 1724 and 1726 he published five brief papers in Philosophical Transactions. Many of the experiments date, however, from 1721.

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Fahrenheit made his thermometers with different scales at different times, commonly known as large, medium, and small scales, their correspondence and values being shown in the following table:

I Large.	II Medium.	III Small.	Corresponding Centigrade.
90°	24°	96°	35.5°
0	12	48	8.8
—90	0	0	—17.8

In No. I the zero was placed at "temperate," as in the Florentine scale; in No. II each space was divided into four equal parts, and these smaller divisions were afterwards taken as degrees, thus forming scale No. III.

Dr. Bolton's book closes with a table showing thirty-five thermometric scales, and a brief bibliography.

A BAROMETER NEEDED IN BALLOON VOYAGES.

From Wiedemann's Beiblätter we translate the following summary of an article by K. T. Fischer, published in Vol. I, 1900, pp. 394–396 of the Physikalische Zeitschrift.

The object of the author was to construct an instrument for measuring atmospheric pressure, proper for use in a balloon, that is not affected by the principal errors that the mercurial and the aneroid are subject to in the balloon. The height of the mercurial column ceases to give a simple measure of the atmospheric pressure as soon as the balloon is in a state of accelerated motion, since the column stands too high or too low according as the acceleration is directed downward or upward, respectively. The indications of the aneroid are much deranged by the uncontrolled elastic reaction of the metallic box. Starting with the three conditions, namely, that the desired barometer shall be (1) independent of the acceleration of the balloon, (2) as sensitive as the mercurial, (3) free from elastic reaction, the author has constructed a barometer that may be best characterized as a cartesian diver, whose weight, assuming a constant temperature of the submerged object, is a function of the gaseous pressure prevailing in its interior and may be used to measure the external air pressure. The barometric body consists of a vessel of glass in the shape of an aräometer; at the end of its stem, 30 cm. long, there is an enlargement which contains an opening below and ends in a sphere filled with mercury. The enlargement is hermetically sealed with respect to the space in the tube of the stem. The enlargement is about half full of water, and when enough mercury is introduced into the sphere to cause the aräometer to sink to a definite position of equilibrium in a vessel filled with water, the position satisfies the condition that the quantity of water displaced by the whole body weighs precisely the same as the aräometer. Since the volume of air in the enlargement varies when the external atmospheric pressure varies, therefore under different pressures the aräometer sinks to different depths in the vessel of water. If we keep the external temperature constant, which is best done by placing the aräometer in water